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Connections in the second order tangent bundle with extended structure group

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Abstract

© 2014, Pleiades Publishing, Ltd. The second order tangent bundle T2M of a smooth manifold M carries a natural structure of a smooth manifold over the algebra D2 of truncated polynomials of degree two in one variable, which gives rise to an extended structure group of T2M and the corresponding extended second order frame bundle (Formula presented.) associated to T2M. Two connections in (Formula presented.) are said to be equivalent if one of them can be mapped into the other by a fiber preserving D2-diffeomorphism of T2M to itself. We establish necessary and sufficient conditions under which two connections in (Formula presented.) are equivalent and in particular the conditions under which a connection in (Formula presented.) is equivalent to a second order differential connection onM.

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Keywords

frame bundle, higher order connection, higher order tangent bundle, Second order tangent bundle, Weil bundle